

Substance abuse and major trauma in Johannesburg

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Summary

Introduction. The abuse of alcohol and drugs is a major public health problem and intoxication is one of the most important risk factors for violence and other causes of injury. The aim of the current study was to evaluate the prevalence of drug and alcohol use associated with injury in adult trauma patients in an inner city trauma unit in Johannesburg.

Methods. A cohort of 105 adult trauma patients admitted to our university trauma unit and its allied medicolegal laboratory were studied in order to provide prospective data and enable us to correlate the prevalence and type of substance abuse with the demographic and injury patterns after major trauma.

Results. Forty-five patients required resuscitation at the Johannesburg Hospital Trauma Unit (JHTU) and 60 patients were examined at the Johannesburg Medicolegal Laboratory (JMLL), giving a total of 105 patients. Blood alcohol concentration (BAC) was positive in 59% of the patients. The average BAC in the trauma unit patients was 37 mmol/l (0.17 g/dl), more than three times the legal limit for driving.

Of the patients 43.7% were positive for urinary cannabis; women were statistically significantly more likely to have taken cannabis than men ($p = 0.039$). There was no difference in rates of exposure to cannabis or alcohol in patients who were the victims of interpersonal violence compared with the victims of accidents ($p = 0.17$). Only 3 patients had taken other drugs of abuse; 2 had taken Mandrax (methaqualone) and 1 amphetamine.

Conclusion. Alcohol and cannabis are commonly misused by trauma patients in Johannesburg; the degree of misuse of other drugs appears to be low. Intoxication is a significant risk factor for violence and accidents and the resultant injuries are a massive burden on our society. Doctors have a responsibility to highlight the association between substance misuse and trauma and should also attempt to persuade individual trauma patients to reduce future alcohol consumption.

In the Middle Ages, alcohol was considered by alchemists to be the elixir of life,¹ but it has more recently been described as an 'ancient plague and a modern poison'.² Alcohol abuse is the third leading non-genetic cause of death in the USA and the link between alcohol and injury is well documented.^{3,4} Alcohol intoxication in trauma patients has been shown to predict increased injury severity, higher numbers of adverse events, and the presence of missed injuries.⁵ In addition, trauma patients who test positive for alcohol are 3.5 times more likely to be readmitted for a second injury compared with other patients.⁶

While the association between alcohol and injury has been documented for many years, there are fewer reports on the pre-injury use of illicit drugs, especially from South Africa. A recent study conducted in Cape Town indicated that although alcohol remains the substance most commonly abused by injured patients, there appears to be an increase in the use of illicit drugs, cannabis being the most common.⁷

Practitioners dealing with trauma patients have been described as 'uniquely positioned to implement programs of alcohol screening, intervention and referral'. However 'despite emphasis on injury control and prevention, little has been done to incorporate alcohol intervention programs into the care of the injured patient'.⁸ This study should serve to further increase awareness of the role of substance abuse in trauma in our society.

Methods

Ethical approval was obtained for the study from the University of the Witwatersrand's Ethics Committee. For 7 days during August 2002, as part of the usual resuscitation process, blood and urine samples were obtained from all trauma victims over the age of 17 years requiring resuscitation at the Johannesburg Hospital Trauma Unit (JHTU). Consent for testing of these fluids for alcohol, cannabis and other drugs of abuse was sought in the emergency room. If the patient was unconscious on admission, following standard ethics protocols for emergency studies, consent was sought once the patient had recovered.

All bodies of patients aged over the age of 17 years requiring forensic autopsy after traumatic injury at the Johannesburg

Medicolegal Laboratory (JMLL) during the study period had blood and urine samples taken as part of the routine medicolegal process. Permission was obtained from the Ethics Committee to test blood and urine for the purposes of the study. Samples were centrifuged and either processed immediately or stored at -20°C. Blood samples were tested for ethanol using an enzymatic method, urine samples were tested for cannabis using optical immunoassay, and gas chromatography mass spectrometry was used to test for other drugs of abuse. Cannabis may be excreted in the urine for up to 2 weeks after exposure and a limitation of this study, in common with other studies from South Africa,⁷ is that we can only document prevalence of use rather than prove intoxication by cannabis at the time of trauma. Categorical variables were analysed using a two-sided Fisher's exact test.

Results

Forty-five patients were admitted to the JHTU, with ages ranging from 18 to 60 years (median 30 years). Thirty-eight of the trauma unit patients were male (84.5%) and 7 patients were female (15.5%). Sixty patients were admitted to the JMLL, with ages ranging between 17 and 73 years (median 30 years). Fifty-two of the forensic patients were male (86.6%) and 8 were female (13.3%). The total number of patients studied was therefore 105 (Table I). Of these, 71 (67.6%) were victims of interpersonal violence, 22 patients (20.9%) were victims of motor vehicle-related trauma, 5 patients committed suicide (4.7%), and other accidents accounted for the remaining 7 patients (6.6%). There was no difference in patient demographics or injury mechanism between the trauma unit and forensic patients.

The legal limit for blood alcohol concentration (BAC) is 10.9 mmol/l (0.05 g/dl). Coma generally occurs at levels above 76 mmol/l (0.35 g/dl) and blood levels greater than 100 mmol/l (0.46 g/dl) are generally fatal. BAC was obtained for 99 patients, of whom 59 tested positive (59.5%) (Table II). Of the patients who tested positive for alcohol, 39 (66%) were over the legal limit for driving. The average BAC in the trauma unit patients was 37 mmol/l (0.17 g/dl), more than 3 times the legal

TABLE II. PATIENTS TESTING POSITIVE FOR BAC AND URINARY CANNABIS (N (%))

	Blood alcohol	Urinary cannabis
Male patients	49/83 (59)	29/73 (39.7)
Female patients	9/15 (60)	6/7 (85.7)
	<i>p</i> = NS	<i>p</i> = 0.039
No consent or insufficient sample	7/105 (6.6)	25/105 (23.8)
Total positive	58/98 (59)	35/80 (43.7)

limit, with the highest concentration (79.4 mmol/l or 0.36 g/dl) in a patient who had fallen from a height. There was no statistically significant difference in rates of BAC in patients who were the victims of interpersonal violence compared with the victims of accidents (*p* = 0.2).

Urinary cannabis assay was obtained for 81 patients; 35 (43.75%) were positive (Table II). Women were statistically significantly more likely to have taken cannabis than men (*p* = 0.039); however, there was no difference in exposure to cannabis in patients who were the victims of interpersonal violence compared with the victims of accidents (*p* = 0.17). Table III shows rates of positive BAC and urine cannabis assay according to mechanism of injury.

Only 3 patients tested positive for other drugs of abuse, 2 for mandrax (methaqualone) and 1 for amphetamine; all were the victims of penetrating injury. Three patients tested positive for opiates, but had been given medication by pre-hospital care providers and these results are most likely to be unrelated to drug misuse.

Discussion

According to the US Department of Transportation, for every person killed in an alcohol-related crash 19 others sustain non-fatal injuries.⁹ The World Bank estimates that injuries related to motor vehicle collisions drain developing economies of 1 - 2%

TABLE I. TOTAL NUMBERS OF PATIENTS ACCORDING TO MECHANISM

Mechanism	Number of patients		Total numbers
	Johannesburg Hospital trauma unit	Johannesburg medicolegal laboratory	
Interpersonal violence			
Blunt assault	5	9	14
Gunshot	18	24	42
Stab	10	5	15
Total			71 (67.6%)
Motor vehicle			
Motor vehicle accident	6	5	11
Pedestrian vehicle accident	2	7	9
Motorbike accident		2	2
Total			22 (20.9%)
Suicide			
Gunshot		3	3
Gas		2	2
Total			5 (4.7%)
Other			
Fall	3	1	4
Work accident	1	1	2
Burn		1	1
Total	45	60	
Grand total			105

TABLE III. BAC AND URINARY CANNABIS ASSAY ACCORDING TO MECHANISM OF INJURY (N (%))

Mechanism	Blood alcohol	Urinary cannabis
Interpersonal violence		
Blunt assault	10/13 (77)	4/11 (36)
Gunshot	25/37 (67)	17/34 (50)
Stab	7/14 (50)	5/11 (45)
Total	42/64 (65)	26/56 (46)
Motor vehicle		
Motor vehicle accident	7/11 (63)	2/9 (22)
Pedestrian vehicle accident	3/8 (37.5)	3/8 (37.5)
Motorbike accident	1/2	0/1
Total	11/21 (52.4)	5/18 (27.7)
Suicide		
Gunshot	1/3	1/2
Gas	2/2	1/1
Total	4/5 (75)	2/3 (66)
Other		
Fall	1/4	1/4
Work accident	0/2	0/1
Burn	1/1	1/1
No consent or insufficient sample	7/105 (6.6)	25/105 (23.8)

of gross domestic product (about \$100 billion) each year, or twice the total development aid received worldwide by developing countries.¹⁰ Injuries caused by motor vehicle collisions and interpersonal violence are major public health problems in South Africa.¹¹ Intoxicated drivers are likely to have significantly higher injury severity scores (ISS), lower Glasgow coma scores, use in-vehicle safety equipment less and experience greater accident-related morbidity.¹² Alcohol is also a major factor in pedestrian vehicle collisions. In a study from Cape Town, BAC was found to be positive in 62.1% of pedestrians injured by cars. BAC-positive pedestrians were nearly 3 times more likely to have a head injury, sustained more severe injuries, more frequently required admission to intensive care, had longer hospital admission and were more likely to die of their injuries.¹³ In our study, we documented a lower level of intoxication compared with the Cape Town study; nevertheless, one-third of pedestrian accident victims had a positive BAC and a similar number had urine positive for cannabis.

Homicide is currently the major cause of death due to injury for men in South Africa, while unintentional injuries are the major cause of injury death for women.¹¹ Apart from the terrible social price exacted by this trauma, the economic burden is massive. Miller and Cohen¹⁴ have estimated that, in 1992, gunshot wounds in the USA cost an estimated \$126 billion, with medical costs of \$154 000 per gunshot survivor.¹⁴ In South Africa, criminal behaviour in general and violent crimes in particular have been found to be significantly associated with intoxication;¹⁵ indeed, 76% of all deaths after interpersonal violence have been shown to be alcohol related.¹⁶

Peden *et al.*⁷ found that 60% of South African trauma patients had positive alcohol levels on breath analysis and 28% could be classified as problem drinkers or possible chronic alcoholics. Problem drinking is known to be linked to high-risk

behaviour, such as dangerous driving and violent and aggressive behaviour.³ This study mirrors the high incidence of alcohol misuse by trauma patients in Cape Town described by Peden *et al.*,⁷ and demonstrates an equally high rate of cannabis use. Unlike countries such as the USA, where there is an epidemic of cocaine and opiate use among trauma patients,⁴ there is little evidence of misuse of drugs other than alcohol and cannabis in Johannesburg, although this is little cause for optimism.

Interventions aimed at reducing future consumption of alcohol in hospitalised trauma patients are not routine. Screening for alcohol disorders in the trauma setting is time consuming and there is a perception that patients will find the topic intrusive or offensive. However, Schermer *et al.*¹⁷ have shown that discussing alcohol in a trauma unit setting was acceptable to patients irrespective of the nature of the trauma or the patient's demographic or cultural background. These data are in accordance with our own findings, as consent to test for alcohol and drugs was refused in the case of only 2 of 46 trauma unit patients (Table I).

Gentilello *et al.*¹⁸ have shown that interventions by emergency room staff aimed at counselling patients can be effective in reducing both alcohol consumption and the rate of hospital re-admission after trauma. In a randomised, prospective controlled trial in a level 1 trauma centre, a total of 2 524 patients were screened for alcohol misuse and 762 patients with positive results were randomised to a brief intervention or control group. At 12 months, the intervention group had significantly decreased alcohol consumption. In addition, there was a 48% reduction in injuries requiring hospital admission over a follow-up of 3 years. Even brief interventions of 5 - 10 minutes of advice have been shown to reduce patients' alcohol consumption.¹⁹

Without intervention, alcohol misuse is unlikely to decline; Dunn *et al.*²⁰ recently conducted a prospective study of 101 randomly selected hospitalised trauma patients and analysed drinking habits during the first year after their injury. Drug and alcohol use dropped markedly 1 month after injury but had returned to pre-injury levels by 4 months. Compared with before the injury, 20% of patients actually worsened their hazardous drinking, and only 6% of patients improved it.²⁰

Morbidity and mortality as a result of trauma is a major burden for our nation and intoxication through alcohol and drugs is a major risk factor for injury. Doctors have a responsibility both to highlight awareness of this problem and to promote substance abuse and injury prevention education. Increased alcohol and drug awareness education must be part of the strategies to improve the health of the nation. In common with trauma patients around the world, few of our patients will have had an opportunity to talk to a health care worker about their drinking or drug habits.¹⁷ South African practitioners should recognise a responsibility to identify substance abuse in patients as they are admitted to hospital and should attempt to intervene positively in at-risk patients to reduce the prevalence of substance abuse.^{8,9,17,18} Dunn *et al.*²¹ have suggested that alcohol screening and advice should be offered to trauma patients in the same way that advice regarding smoking cessation is offered in adult respiratory medicine clinics, and blood pressure, cholesterol, dietary, and exercise advice is provided in coronary care units. The responsibility to provide counselling for patients injured after taking alcohol or drugs lies not with specialised treatment centres, but with the physicians and other health care staff in general hospital settings who should be trained to provide brief interventions.

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